U.S. National Working Group for OIML TC 9/SC 1
U.S. Responses to Questionnaire on the Revision of OIML R 76

1. General

1.1 Has OIML R76 been implemented in your country (i.e., does is your national legislation as regards non-automatic weighing instruments (NAWI's) conform with OIML R76?

Yes ☐ / *Partly* ☒ / *No* ☐

Additional remarks: R 76 is not fully implemented in U.S. requirement for weighing instruments contained in NIST Handbook 44 "Specifications, Tolerances and Other Technical Requirements for Weighing and Measuring Devices (HB 44)." Changes made to the HB 44 Scale Code in 1986 were a reasonably successful first-step effort by the U.S. legal metrology community to meet the U.S.'s moral obligation under the OIML Treaty and harmonize our NAWI requirements with R 76. For example, HB 44 requirements were changed from a relative (% of applied load) to a step tolerance structure and requirements for influence most of the factor testing required under R 76 in type evaluation were added. For example, temperature tests are fully harmonized. In 1986, the full implementation of R 76 would not have met the needs of the U.S. marketplace. The scale code changes included an additional class (III L) for heavy capacity scales (e.g., highway vehicles) with an allowable N_{max} of 10 000 d. Also, the requirements for humidity tests were adopted but later removed (again for practical and cost/benefit reasons) from HB 44. While OIML Class IIII requirements are included in HB 44 they are limited to instruments used in law enforcement. Another difference between HB 44 and R 76 is that the EMI/RFI requirements for type evaluation were not adopted but instead were relegated for evaluation only as part of in-situ field-testing (See response to 1.3).

Today, nearly 16 years after HB 44 first began to reflect R 76, there is a concerted effort among instrument manufacturers and the National Conference on Weights and Measures Inc. (NCWM) and its National Type Evaluation Program to consider adoption of R 76 requirements (and other OIML Recommendations where appropriate) whenever revisions to HB 44 and associated type evaluation requirements and test procedures are contemplated. This is a positive trend and support for harmonization with R 76 in the U.S. continues to grow. We are pleased to report that to support this move towards greater harmonization of NAWI requirements a study has been initiated to identify and document the differences between the U.S. and OIML NAWI requirements. The study will facilitate harmonization efforts and will include a comprehensive intercomparison of the requirements for NAWIs in HB 44 and NCWM Publication 14 to those in OIML R 76 and R 60. This study will be based on the 2003 edition of HB 44 be will be submitted to the Co-Secretariats to supplement our responses to this questionnaire when it is completed.

It is important to remark that your initiation of this revision of R 76 is sure to generate more interest in harmonization, as it is apparent that the Co-Secretariats are committed to listening to the users of this important Recommendation and to developing a new edition of R 76 that will achieve greater international adoption.

1.2 If your answer to 1.1 is "*Yes*" or "*Partly*":

Would you accept a revision of R76 if this implied a corresponding revision of the national legislation in your country?

Yes ☒ / *No* ☐ / *This would depend on the degree of changes to R 76* ☐

In the latter case:

We could accept a revision of R76 if ... (you could refer to 2.1ff, 3.1ff, 4.1ff):

U.S. instrument manufacturers could accept a revision of R 76 if:

- Paragraph 3.9.1 is revised to have the unit tested with the limits indicated on the leveling device. Current requirements look at the leveling device and then test to the greater tilt of the leveling device or 2/1000.
- Paragraph 3.9.2.3 is revised as we propose in 2.3 below.
- Paragraph 4.14.1 is revised to remove tare and preset tare as a primary indication.
- Paragraph 4.14.6 is revised to remove or modify the minimum height requirement and eliminate the 0.5 mm tolerance on display heights.
- Type evaluation of indicators and weighing modules is implemented (see our comments in 4.5).

Additional remarks:

1.3 If your answer to 1.1 is "*No*":

Is the content of OIML R76 the reason that it has not (yet) been implemented in your national legislation? Is there, for instance, disagreement with some basic principles or with special requirements of R76?

Yes ☐ / *Partly* ☒ / *No* ☐

If "Yes" or "Partly": The reason is: The U.S. has adopted the approach that EMI/RFI factors are, for practical and cost/benefit reasons, more efficiently and effectively addressed in-situ field-testing and not as a type evaluation requirement.* There is little disagreement that equipment designed for the R76 EMI/RFI tests is more immune to those effects in the field. However, the R76 requirements do not guarantee that an instrument will be immune to the effects of EMI/RFI in all of the environments in which an instrument could be operated. The U.S. Federal Communications Commission shielding requirements have played a major role in reducing emissions and appear to have contributed to mitigating some harmful EMI/RFI effects.

*Note that the U.S. can and will conduct the R76 EMI/RFI tests as a part of any OIML R 76 related type evaluations.

Do you have any experience with non-automatic weighing instruments that conform with R76 but which, however, fail to be suitable for applications subject to legal control?

Yes ☐ / *No* ☒

If "Yes": Our experience and suggestions concerning R76 are:

1.4 Further general remarks:

Additional remarks:

2. Basic principles and items

OIML R76 contains some basic principles as listed under 2.1 to 2.5 *(the numbers in brackets refer to R76-1)*. Before going into the details under points 3 and 4 you are asked whether you **confirm** (C) the respective principle or whether you suggest an **amendment** (A) or a **revision** (R). In the case of (A) or (R) you are asked to make a proposal and give your rationale.

2.1 Definition of a NAWI (*T.1.1, T.1.2*): *C* ☐ / *A* ☐ / *R* ☒

If (A) or (R): Our proposal & rationale is:

T.1.1 – The U.S. believes the second sentence should end with the wording"… related to the determined mass. This revision is more specific in identifying that the other quantities, magnitudes, parameters or characteristics are related to the determined mass.

T.1.2 – The U.S. believes the definition of a non-automatic weighing instrument should be focused on the fact that the item to be weighed is in a static condition as opposed to operator intervention. We think that an item could be moved onto and off of the instrument by some other means (e.g., conveyor belt) than an operator. Perhaps the examples of NAWI can be elaborated to provide the clarification we think is needed.

2.2 Definition of Accuracy Classes (*3.2, 3.3, 3.4*):

C ☒ / *A* ☐ / *R* ☐

If (A) or (R): Our proposal & rationale is:

2.3 Error regime (*3.5 - 3.9*): *C* ☐ / *A* ☒ / *R* ☐

If (A) or (R): Our proposal & rationale is: With the possible acceptance of the type evaluation of modules §3.5.5 will need revisions. Also, error apportionment may need updating (consideration of digital load cells for example).

Below is paragraph 3.9.2.3 from R 76. The U.S. recommends that 3.9.2.3 be revised to provide the advantages of a zero tracking device in a multiple range scale to reduce the relative error of weighing light loads. A suggested rewrite is:(added text is underlined, deleted is crossed out)

3.9.2.3 Temperature effect on no-load indication

The indication at zero or near zero shall not vary more than one verification scale interval for a difference in ambient temperature of 1 °C for instruments of class 1 and 5 °C for other classes.

For multi-interval instruments and for multiple range instruments without a zero tracking device, this applies to the smallest verification scale interval of the instrument.

For multiple range instruments with a zero tracking device, this applies to the largest verification scale interval of the instrument.

Example: A multiple-range weighing instrument has two weight ranges; 0 - 6 kg by 2 g and 0 - 15 kg by 5 g. The previous wording required a zero drift with temperature to be less than 1 part in 7 500 for every 5 degrees C. (2 g divided by 15 kg). The new wording allows a zero drift with temperature to be 1 part in 3 000 for every 5 degrees C. (5 g divided by 15 kg). The relative error of weighing a 100 g load decreases from 5 percent to 2 percent. For a 30 g load (one slice of cheese) the relative error is reduced from 16.7 percent to 6.7 percent.

Justification: As we attempt to implement an effective production-meets-type program, the probability of failure increases greatly as the tolerances becomes tighter with no known benefit to either the customer or legal metrology goal of equity in the marketplace. If the instrument is at the center-of- zero before a transaction occurs, it will accurately weigh, with or without a tight zero drift with temperature specification.

2.4 Modular concept (*3.5.4, 3.5.5, 8.2.1*):

C ☒ / *A* ☐ / *R* ☐

If (A) or (R): Our proposal & rationale is: The U.S. experience with type evaluation of modules* is well-established (i.e., almost 30 years of experience with digital indicator modules) and an accepted concept in the U.S. legal metrology system. For high capacity instruments, it is the only practical means of having any degree of assurance that the scale is capable of meeting temperature/pressure/power interruption requirements. This concept has been accepted in Europe for load cells and in WELMEC for indicators and should be incorporated into R 76 and the OIML Certificate System.

*module means "separate elements" such as indicators or load receiving modules.

2.5 Treatment of items normally controlled by national legislation (e.g., verification marks (*7.2*), subsequent metrological control (*8.4*)):

C ☐ / *A* ☐ / *R* ☒

If (A) or (R): Our proposal & rationale is:

We recommend that Chapter 7 be revised to include a statement regarding language.

We believe paragraph 8.3.4 Stamping and section 8.4 Subsequent Metrological Control (e.g., also includes language on initial verification) should be deleted. R 76 should be limited to product specifications, test procedures and tolerances. Compliance with R 76 requirements is determined at two different levels (e.g., type evaluation and field levels) and this revision process provides an opportunity to separate and clarify the Recommendation so that the requirements and test procedures for type evaluation and field inspection are separate. Field level tests such as initial and subsequent verification tests and user and installation requirements must be based on R 76 but should be left to the discretion of national regulations which must also have requirements which are appropriate and applicable to "legacy" instruments currently in the marketplace which will not meet R76. Perhaps it is time to have a separate OIML Document based on R 76 that could be adopted into national regulations for field level application.

2.6 Other general items:

In addition to 2.1 through 2.5 the following basic principle(s) or general item(s) should also be considered:

3. Special items and aspects

The following list contains special items and aspects that should be considered *(the numbers in brackets refer to R76-1)*. Again you are asked whether you **confirm** (C) the relevant chapter or whether you suggest **amendments** (A) or a **revision** (R) of certain paragraphs. In the case of (A) or (R) you are asked to make a proposal and give your rationale.

3.1 Terminology (*T*):

C ☐ / *A* ☒ / *R* ☐

If (A) or (R): Our proposal & rationale is: Revise T.1.2.7 to recognize the universal use of digital price-computing displays.

3.2 Scope (*1*):

C ☒ / *A* ☐ / *R* ☐

If (A) or (R): Our proposal & rationale is:

3.3 Principles of the Recommendation (2):

C ☒ / *A* ☐ / *R* ☐

If (A) or (R): Our proposal & rationale is:

3.4 Metrological requirements (3):

C ☐ / *A* ☒ / *R* ☐

If (A) or (R): Our proposal & rationale is: See comments in 1.2. Paragraph 3.5.5 should be amended to allow testing of modules.

3.5 Technical requirements (self- or semi-self-indicating instruments) (*4*):

C ☐ / *A* ☒ / *R* ☐

If (A) or (R): Our proposal & rationale is: See comments in 1.2. Below is paragraph 4.14.6 from R-76. The U.S. recommends it be revised to allow the use of the graphical displays seen more often in today's instruments. A suggested rewrite is: (added text is underlined, deleted is ~~crossed out~~)

4.14.6 Visibility
All primary indications shall be displayed clearly and simultaneously to both the vendor and the customer. On digital instruments that display primary indications, the numerical figures displayed to the customer ~~on either set~~ shall be ~~of the same dimension and at~~ least 10 9.5 mm high, ~~with a tolerance of 0.5 mm~~. On an instrument to be used with weights it shall be possible to distinguish the value of the weights.

~~Acceptable solution~~
~~The primary indications should be grouped together in two sets of scales or displays~~.

Justification: The item specifically addressed is the required text size for the vendor, 9.5 mm is a very large size for an operator who is less than an arms length away. The first sentence statement "displayed clearly" should be sufficient for the vendor.
Alternate thoughts: Non-digital displays are required to be readable from 0.8 meters away (T.5.4.4), why is the distance effectively greater for a digital display?

Should the "Acceptable solution…" text be deleted? There is a difference of opinion in the interpretation of this text. Does it mean the customer display must be identical to the operator display?

3.6 Requirements for electronic instruments (5):

C ☒ / *A* ☐ / *R* ☐

If (A) or (R): Our proposal & rationale is:

3.7 Technical requirements (non-self-indicating instruments) (*6*):

C ☒ / *A* ☐ / *R* ☐

If (A) or (R): Our proposal & rationale is:

3.8 Marking (7):

C ☒ / *A* ☐ / *R* ☐

If (A) or (R): Our proposal & rationale is:

3.9 Metrological controls (8):

C ☐ / *A* ☒ / *R* ☐

If (A) or (R): Our proposal & rationale is: See comments in question 2.5

3.10 Testing procedures (*Annex A*):

C ☐ / *A* ☒ / *R* ☐

If (A) or (R): Our proposal & rationale is: The requirement to perform two tare-weighing tests should be reduced to one test. Two tests are not necessary. Same comments as in question 1.2, regarding tilt test. Class I and II instruments should be exempt for the Discrimination test in A.4.8.

3.11 Additional tests for electronic instruments (Annex B):

C ☐ / *A* ☒ / *R* ☐

If (A) or (R): Our proposal & rationale is: Reduce the voltage levels for the Electrostatic Discharge Test and the field strength levels for the Immunity Test stated in Annex B paragraphs B.3.3 and B.3.4 for instruments or components that are intended for use in hazardous area environments. Instrument designed for this type of environment are required to use reduced operating and excitation voltage levels making them very susceptible to external influences. These influences are not permitted in hazardous area environments. The U.S. would agree with a marking requirement indicating this limitation.

3.12 Documentation to be supplied by the manufacturer (8.2.1.2):

C ☒ / *A* ☐ / *R* ☐

If (A) or (R): Our proposal & rationale is:

3.13 Pattern Evaluation Report, R76-2:

C ☒ / *A* ☐ / *R* ☐

If (A) or (R): Our proposal & rationale is: Is it possible to provide R 76-2 in an electronic format to better automate the process and so that laboratories can use the same software programs to facilitate data exchange?

3.14 Other special items:

In addition to 3.1 through 3.13 also the following special item(s) should be considered:

4. New developments

In the following some new developments as regards NAWI's are listed which could be taken into account when revising R 76. You are asked to indicate whether you would like the respective item to be dealt with in R 76, and if so to make a proposal and give your rationale. For the items "4.4 Definition, testing & certification of families of weighing instruments" and "4.5 Testing & certification of modules of weighing instruments," please also refer to the Draft Revision of OIML TC3/SC5 document "OIML Certificate System for Measuring Instruments" (April 2002) which presents new possibilities compared to the existing OIML Certificate System (e.g., certification of modules, families of measuring instruments and modules).

4.1 Vehicle mounted Non Automatic Weighing Instruments (NAWI's) (e.g., special tilt requirements, EMC requirements for DC power supply, etc.):

Should this item be dealt with in R 76?

Yes ☒ / *No* ☐

If "Yes": Our proposal & rationale is: Requirements appropriate for all applications of NAWIs should included in R76 but they must not limit technical progress.

4.2 PC's used as peripheral equipment / as modules (e.g., PC's used as indicators):
Should this item be dealt with in R 76?

Yes ☒ / *No* ☐

If "Yes": Our proposal & rationale is: PCs are a part of many NAWI instruments and R 76 should either recognize or, at a minimum, not prohibit their use. Software aspects / requirements: Should this item be dealt with in R 76?

4.3 Software aspects / requirements:
Should this item be dealt with in R 76?

Yes ☐ / *No* ☐

If "Yes": Our proposal & rationale is: We cannot respond to this question, as we do not understand its scope. We would like to receive additional information to clarify the scope and details of software controls that are envisioned for possible adoption. We may support changes in this area once we learned more about what is meant by "software aspects."

4.4 Definition, testing & certification of "families of weighing instruments":
Should this item be dealt with in R 76?

Yes ☒ / *No* ☐

If "Yes": Our proposal & rationale is: Testing an appropriate number of instruments representative of a family will speed up the type approval process, lower costs to manufacturers and users, and provide other efficiencies.

4.5 Testing & certification of modules of weighing instruments:
Should this item be dealt with in R 76?

Yes ☒ / *No* ☐

If "Yes": R 76 currently defines the requirements but those applicable to modules should be identified to ensure uniform application (e.g., an Annex or checklist for modules should be appropriate?). We believe the concern here is not as much with R76 but with the OIML Certificate System which must be modified to permit the issuance of Certificates of Conformance to modules.

1. Testing & Certification should be possible for the following modules:

Indicators and weighing elements.

2. Our proposal & rationale is: The U.S. submits an attachment with contains a Pre-Working Draft of an International Recommendation "Digital indicators for weighing instruments" so it can be discussed under the existing project 1 under TC9/SC 1 "Revision of R 76." The intent of the Recommendation is to provide a concise summary of the requirements in R 76 applicable to indicator modules along with the test reports needed to include R 76 indicator modules under the OIML Certificate System.

4.6 Other new developments:

In addition to 4.1 through 4.5 also the following new development(s) should be considered:

5. Suggestions, final remarks

Suggestions, missing items, final remarks, etc.: We commend the Co-Secretariats for initiating this work and for setting a positive and cooperative tone at its beginning. We look forward to working with you.

For additional information or clarifications please contact:

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